ELECTROMACH member of the R.STAHL Technology Group

OPERATING INSTRUCTIONS

EEX P CONTROL UNIT

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OPERATING MANUAL FOR EEXP CONTROL UNIT

When work takes place in hazardous areas, the human safety and the safety of systems are contingent on the adherence to all relevant safety regulations.

For this reason, the installation and maintenance personnel working in such systems have a special responsibility. The precondition for this is an accurate knowledge of the applicable regulations and provisions.
This manual briefly summarises the most important safety measures. It is intended to supplement the relevant regulations which must be studied by the personnel responsible.

1 SAFETY INSTRUCTIONS

Only employ the control unit for the permitted purpose. Incorrect or non-permissible deployment and/or non-compliance with the instructions of this operating manual shall invalidate any warranty by us.

Modifications and constructional alterations to the control unit which impair the explosion protection are not permitted.

The control unit must only be operated in an undamaged and clean condition.

When installing and operating / utilising the control unit, the following must be paid attention to:

- The national safety regulations;
- The national accident-prevention regulations;
- The national installation and assembly regulations;
- The generally accepted rules of technology;
- The safety instructions of this operating manual;
- The characteristic values and measurement operating conditions specified on the type and data plates;
- Other instruction plates / labels on the control unit.

Any damage can compromise and even neutralise the explosion protection.

2 GENERAL REMAKRS AND WARNING NOTES

- Work on live parts other than intrinsically safe circuits is fundamentally prohibited while a danger of explosion exists.
- A protective-earth conductor must be connected to the protective-earth-conductor connection before any other connections are made.
- Before switching on, it must be ensured that the operating voltage corresponds with the values specified on the type plate.

- It must be ensured that only safety fuses of the specified type and of the nominal (rated) amperage be utilised as a replacement / as spare parts. The use of shorted-out safety fuses or short-circuit bridges is not permissible.
- If the possibility exists that safe operation can no longer be ensured, the control unit must be switched off and prevented from being switched on again.

We will gladly send you a copy of the EU design test certification together with the relevant appendix on request.

3 NORM COMPLIANCE

The device fulfils the following regulations and norms:

- Directive 94/9/EU
- EN 50014: 1997+A1-A2
- EN 50016: 1995
- EN 50018: 2000
- EN 50019: 2000
- EN 50020: 1994
- EN 954-1: 1996

4 TECHNICAL DATA / FUNCTION

4.1 FUNCTION FOR UTILISATION AS A PRESSURISED ENCLOSURE WITH COMPENSATION OF LEAKAGE LOSSES

After the safety mechanism is switched on, a pressure builds up in the housing.

The pressure sensors employed in the display/measurement module monitor the internal pressure of the housing and the differential pressure on the measurement aperture.
If the pre-set measurement values Min A + B and Diff A + B are exceeded, then the pre-set purging time starts. The relevant LED in the control unit lights up and the residual purging time in the display/measurement module tends towards zero.

If, due to an impermissibly high flow resistance on the protective-gas output, a too high housing internal pressure is reached during the purging phase, the purging operation is terminated. It is only possible "after elimination of the possible cause" to switch on again by pressing the switch S5 of the control module (turn to pos. 0, turn back to pos. 1).

If a too low protective gas flow is measured on Diff A or Diff B during the purging phase, the residual purging time is reset to the maximum purging time value.
Please check the input pressure on the reducing valve, housing seal, and doorlocks.

After the purging time is over, the magnetic-valve protective gas is switched off and the voltage supply of the control unit is enabled via the contacts K2/K3 on terminals 34 and 35. Contacts K4 and K5 switch in accordance with the configuration. The Operation LED in the control unit lights up.

The required leakage-loss is compensated by the integrated needle valve.
The residual purging time display goes out and the existing internal pressure of the housing is displayed on the sensor module.

If the housing pressure falls below the switching value Min A or Min B during the operating phase, K2/3 and the configured K4/5 are released.
This switches off the power of any connected non-Ex devices.
Simultaneously, a pre-purging phase commences. The voltage is enabled after a time delay (approximately 5 seconds) in order to compensate any possible protective gas fluctuations in the mains.

Please check the housing seal, the doorlocks and whether the leakage loss compensation is still adequate.

Please note that if the value in the display/measurement module PD1 sinks below the pre-set value (DP1), the magnetic valve opens briefly in an attempt to compensate a leakage loss.

This triggering of the magnetic valve usually indicates that the sealing of the system needs to be checked.

If the housing pressure exceeds the switching value "Max" during the operating phase, the power of terminals 34 and 35 is switched off immediately but only for the duration of the excess pressure. After the pressure falls back below the "Max" value, the system is switched on again without delay. Please verify the safety function (relief) of the measurement aperture.

The purging time and switching values of the pressure switches are pre-set at the factory. This also applies for relays K4/5.

4.2 FUNCTION FOR UTILISATION AS A PRESSURISED ENCLOSURE WITH CONTINUOUS RINSING

After the safety mechanism is switched on, a pressure builds up in the housing.

The pressure sensors in the display/measurement module monitor the internal pressure of the housing and the differential pressure on the measuring aperture. If the pre-set measurement values Min A + B and Diff A + B are exceeded, then the pre-set purging time starts. The relevant LED in the control unit lights up and the residual purging time in the display/measurement module tends towards zero.

If too high a housing internal pressure is reached during the purging phase due to an impermissibly high flow resistance on the protective-gas output, the purging operation is terminated. It is only possible "after elimination of the possible cause" to switch on again by pressing the switch S5 of the control module (turn to pos. 0, turn back to pos. 1).

If a too low protective-gas flow is measured on Diff A or Diff B during the purging phase, then the residual purging time is reset to the maximum purging time value.
Please check the input pressure on the reducing valve, housing seal and doorlocks.

After the purging time has elapsed, the voltage supply of the control unit is enabled via the contacts K2/K3 on terminals 34 and 35. Contacts K4 and K5 switch in accordance with the configuration. The Operation LED in the control module lights up. The residual-purging-time display goes out and the existing housing internal pressure is indicated on the sensor module.

If the housing pressure falls below the switching value Min A or Min B during the operating phase, K2/3 and the configured K4/5 are released. This switches off the power of any connected non-Ex devices.

Simultaneously, a new pre-purging phase commences. The voltage is enabled after a time delay (approximately 5 seconds) in order to compensate any possible protective gas fluctuations in the mains.

Please check the housing seal, the doorlocks and whether the input pressure is still adequate.

If the housing pressure exceeds the switching value "Max" during the operating phase, the power of terminals 34 and 35 is switched off immediately but only for the duration of the excess pressure. After the pressure falls back below the "Max" value, the system is switched on again without delay. Please check the input pressure and that the measurement aperture is functioning correctly.

The purging time and switching values of the pressure switches are pre-set at the factory. This also applies for relays K4/5.

4.3 TECHNICAL DATA

Explosion protection	Ex EExp ....IIB/C T4 ... 6
Test certificate	DMT 01ATEX E116U
Ambient temperature	During storage and transport -20° ... + 80° Operation -20° ... + 40°
Degree of protection to IEC/CEI 60529	max. IP 54, minimum
Permissible humidity	< 90% relative humidity, annual average
Measurement operating voltage	230 VAC 48-62 Hz (± 10%)
Optional	115 VAC (± 10%)
Purging time	Adjustable from 0-99 min.
Pressure values	Tolerance of each pressure sensor ± 2% of the range

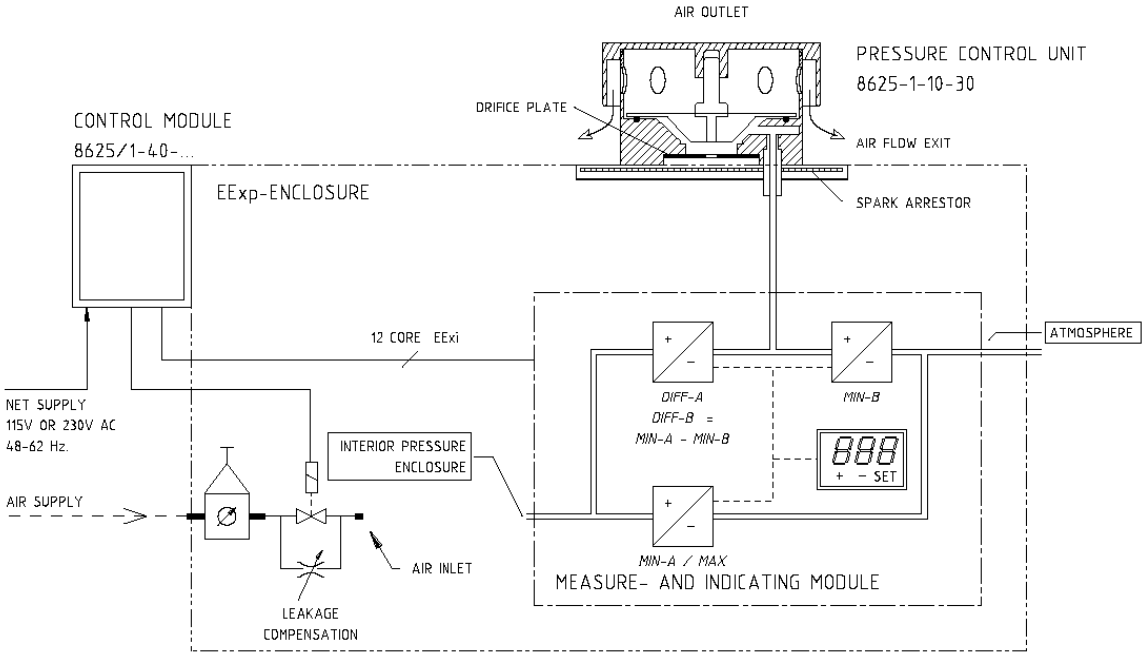
Sensor range

	System range mbar		
Sensor range	0-25	0-300	0-1000
DIFF A	0-25	0-29.9	0-29.9
DIFF B	0-25	0-29.9	0-1000
MIN A	0-25	0-300	0-1000
MIN B	0-25	0-300	0-1000
MAX	0-25	0-300	0-1000
MAX1	0-25	0-300	0-1000

Conversion	100 Pa = 1 mbar = 0.001 N/m³ = 10 mm WS 1 bar = 0.1 mPa
Relays K2/3	Switching capacity max. 5A for cos phi = 1 (253 VAC). Time delay 5 sec.

Relays K4 and K5	Safety-related values Max. 100mA / 10V Max. 30 mA / 30V
Output A1	Connection of the input valve max. 7 VA
Connection terminals	Max. 1x 2.5mm² per terminal
Protective gas	Inert gas or dry, oil-free industrial compressed air
Temperature control (optional)	Thermostat (NO, closing)

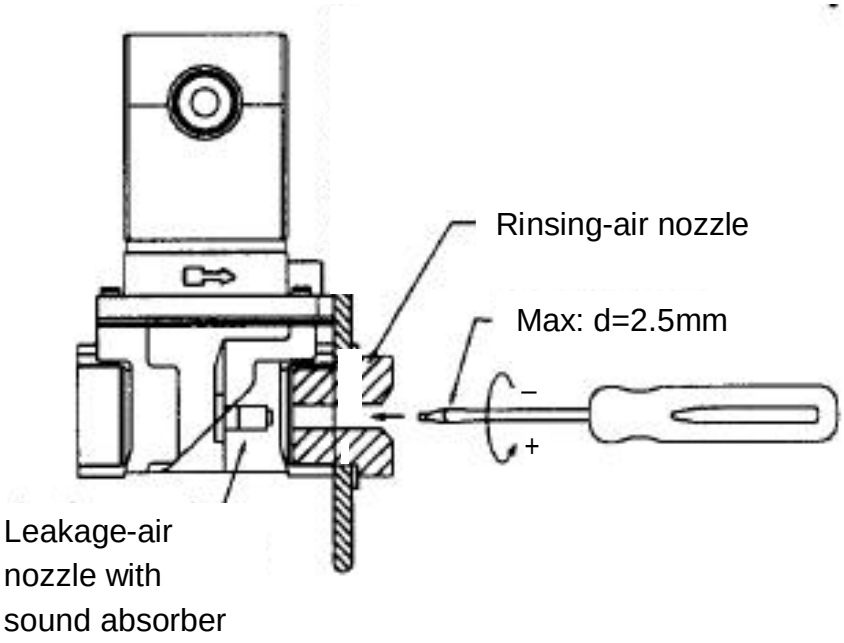
4.4 SCHEMATIC STRUCTURE



4.5 ADJUSTMENT OF AIR VOLUMES

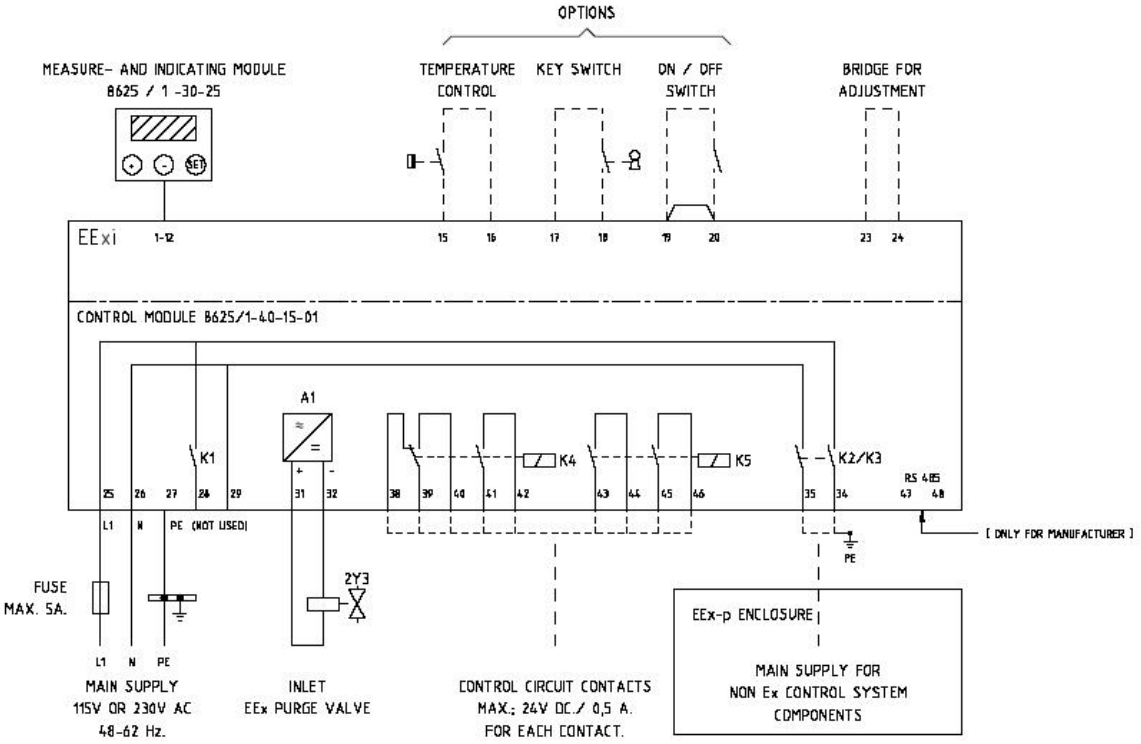
Purging-air volumes and compensation leakage air losses are values determined at the factory.

If necessary, the setting for leakage air loss can be adjusted as follows.



The air volume can be varied by turning the adjustment screw (which is accessible through the purging-air nozzle) to the necessary value using a suitable screwdriver. (Turning in the counter-clockwise direction increases the leakage-loss volume)

5 CONNECTION OF THE ELECTRICAL WIRES



6 STATE TABLE

The monitoring unit is constructed in accordance with EN 50016 and satisfies the requirements specified therein. The workflows of the various states are detailed below.

STATE	CONDITIONS, ALL OF WHICH MUST BE FULFILLED	RESULT WHEN ALL CONDITIONS ARE SATISFIED
Preparation for the start of the control device	a) Mains voltage connected b) Internal pressure less than MAX c) Pre-purging time determined and set d) Pre-purging time has not elapsed	Control device ready for pre-purging
Pre-purging is running	a) Internal pressure greater than MIN A b) Internal pressure greater than MIN B c) Internal pressure less than MAX d) Minimum flow greater than DIFF A e) Minimum flow greater than DIFF B f) Pre-purging time has not elapsed	Pre-purging time is running
Pre-purging finished. Voltage supply of the non-Ex devices switched on	a) Internal pressure greater than MIN A b) Internal pressure greater than MIN B c) Internal pressure less than MAX d) Pre-purging time has elapsed e) ON/OFF switch closed	K2/K3 closed K4/K5 closed

7 SETTING THE PARAMETERS

All parameters such as Min A, Min B, Diff A, Diff B, Max/DP1, function K4/K5, purging time, temperature adjustment, time delay for switching off the power are set at the factory.

If the pre-settings or the control unit are modified without the written consent of Electromach, then the warranty is invalidated.

Rotary switch S 5 of the control module

Rotary switch S 5 is a reset switch and is used to restart the system during adjustment operations.

Rotary switches S 2 to S 4 of the control module

The purging time is set using the rotary switches S 2 to S 4. It is possible to set the minutes in steps of 10 and 1. The seconds can only be set in steps of 10.

Rotary switch S 1 of the control module

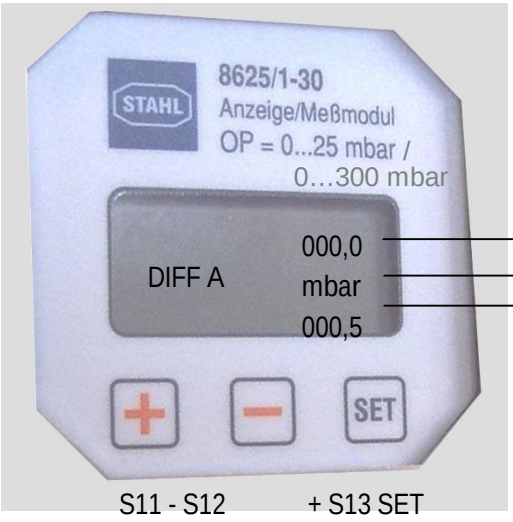
The various switching values of the control devices can be displayed and adjusted using rotary switch S 1.

The following parameters are assigned to the switch positions:

SWITCH POSITION	PARAMETER
0	Display of the internal pressure of the housing, target / reference value and residual-purging-time value
1	Display of set point value "DIFF A" and actual value
2	Display of set point "DIFF B" and actual value
3	Display of set point "MIN A" and actual value
4	Display of set point "MIN B" and actual value
5	Display of set point "MAX" and actual value
6	Max 1
7	Min P
8	Display of the function of "K4"
9	Display of the function of "K5"

Switches S 11 to S 13 of the display/measurement module 8625/1-30-25

Switches S 11 to S 13 are used for changing and storing set points selected using S 1. A change of value is only possible after connection of the safety bridge on terminals 23 and 24.



Actual value
Switching value
Target value

Pressing the + or - keys once causes the value to change by 0.1 mBar. After pressing more than 25 values continuously, the value changes in steps of 1 mBar. By pressing the - key, the value can be changed to a minimum of zero. By pressing the + key, the value can be changed to a maximum of 100% of the current value. The stored value is indicated by a ".".

Switch S 1 to position 8 and 9

By pressing the + or - key, it is possible to select between function 0 and function 10 for the relays

A function change does not take place until after the system is restarted using S 5.

Switch position	Parameter
0	Switches at the same time as K2
1	Switches if the set point of DIFF A is exceeded
2	Switches if the set point of DIFF B is exceeded
3	Switches if the set point of MIN A is exceeded
4	Switches if the set point of MAX is exceeded
5	Not used
6	Switches if the purging time counts off
7	Not used
8	Switches if the key-switch is set to bypass
9	Switches at an internal malfunction

Bypass key-switch

The bypass key-switch switches off the safety mechanism.

When the bypass key switch is pressed, the LCD display of the display/measurement module indicates the following:

K2 Function
Close K2
With “+”

K2 Function
Open K2
With “-“

The pushbutton switches + and - on the display/measurement module can be used to switch the release protection on and off.

Parameters of the control device can be modified by manufacturers using the RS 485 interface.

However, parameters can only modified by authorised personnel because functional changes invalidate the EU design test certification and conformity declaration.

Because of "danger of explosion", special permission must be obtained before pressing the bypass key-switch.

After properly connecting all external electrical and mechanical equipment, a check should first be made that the electrical equipment is set up and connected correctly.

Malfunction	Possible cause	Remedy
Device is not operating, LED "Mains" is not lighting	Mains voltage not connected	Check the mains-voltage supply wire
	Device defective	
The electrical devices are connected without a pre-purging phase	Key switch switched on, bridge on terminals 17 and 18	Switch off key switch, remove bridge
LED "Purging time is running" does not flash during the purging time	Protective gas not connected	Connect protective gas
	EEx digital valve does not open	Check that the supply voltage (terminals 31 to 33) is connected to the digital valve
		Check the valve connection to ensure that extraneous particles are not present in the mechanical part.

	A sufficient volume of protective gas is not flowing through the Ex-p housing	Increase the input pressure to the nominal / required value
	The nominal / required pressure of the reducing valve is not attained	Protective-gas supply too low. Increase the cross-sectional area of the supply line
	During the pre-purging phase, housing is leaking on account of excessive internal pressure.	Seal the housing by taking appropriate measures
After the pre-purging phase, EEx digital valve does not switch over to the small nozzle (only under § 5.1)	Valve connection does not close	Check that the supply voltage of the valve connection is switched off
		Check that there are no extraneous particles in the mechanical part of the valve connection
	Temperature sensor is connected. Internal temperature is too high	Wait until the internal temperature has dropped as a result of the increased flow, or else check the setting of the temperature switching value
The control device does not connect the electrical devices after the pre-purging phase	ON/OFF switch / bridge is not connected on terminals 19 and 20	Turn on the ON/OFF switch / connect bridge on terminals 19 and 20
	Pressure in the housing exceeds the switching value of "MAX"	Reduce the air flow of the leakage air nozzle
After the purging time, the control device switches off the electrical devices after a time	Housing has a leak, pressure switches "MIN A "and "MIN B" set too low	Seal the housing

delay of 5 seconds.	Leakage compensation valve on the digital valve is too small	Increase the air flow of the leakage-air nozzle
Digital valve connects temporarily during the operating phase (only under § 5.0)	Housing has a leak, valve connection attempts to retain the internal pressure level by opening the purging-air nozzle	Seal the housing or increase the flow capacity of the leakage-air nozzle
When the pressure drops, the electrical devices do not switch off	Is the bridging key switch switched on?	Switch off the key switch

Please consult with Electromach b.v. before operating under conditions which deviate from the standard operating conditions!

8 INSTALLATION

Mains connection:

- The wiring connection must be made very meticulously;
- The wiring insulation must extend all the way to the terminal. When baring wires, the conductor itself must not be damaged (notched);
- By appropriately choosing the wires being utilised and by properly laying the wires, it must be ensured that the maximum permissible conductor temperatures are not exceeded;
- Pay attention to the specifications in the technical data relating to the terminals;
- Protect the measurement aperture against spraying water.

Additional specifications

Protective-earth conductor connection:
The connection of a protective-earth conductor is essential / potential equalisation

9 COMMISSIONING

Before you commission the control unit, please ensure that:

- the control unit was installed in accordance with the regulations;
- the equipment is not damaged;
- no extraneous particles are present in the control unit;
- the control unit is connected correctly;
- the cables are inserted properly;
- all bolts and nuts are tightened firmly;
- the wires are connected firmly;
- unutilised wire entry points are sealed with plugs which are certified in accordance with Directive 94/9/EU and unused drill holes are sealed with plugs which are certified in accordance with Directive 94/9/EU.

10 MAINTENANCE AND REPAIR

Maintenance, repair and servicing work on the EEx devices must only be performed by personnel who are both authorised and suitably trained for this purpose. Before commencing any such work, switch off the power of the devices.

Please pay attention to the national regulations applicable in the country of deployment!

The following points must be verified before any maintenance work is carried out:

- that the terminal wires are properly positioned;
- that the correct operating temperature is the case;
- that the switch cabinet is sealed.

11 ACCESSORIES / SPARE PARTS

Only use original accessories and original spare parts manufactured by R. STAHL/Electromach b.v.

12 WASTE DISPOSAL

Please observe your national waste-disposal regulations

If you have any specific questions, do not hesitate to contact us. Please contact the R. STAHL / Electromach organisation responsible.

13 EC-TYPE EXAMINATION CERTIFICATE

KEMA

(1) **EC-TYPE EXAMINATION CERTIFICATE**

(2) **Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC**

(3) EC-Type Examination Certificate Number: **KEMA 04ATEX2103** Issue Number: **2**

(4) Equipment: **Pressurized Enclosure Type EBP-1-A**

(5) Manufacturer: **Electromach B.V., Member of the R. STAHL Technology Group**

(6) Address: **Hamerstraat 10, 7556 MZ Hengelo, The Netherlands**

(7) This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) KEMA Quality B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.

The examination and test results are recorded in confidential test report number 2021567-2.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014 : 1997 + A1, A2	**EN 50016 : 2002**	**EN 50018 : 2000 + A1**
EN 50019 : 2000	**EN 50020 : 2002**	**EN 50028 : 1987**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

Ex **II 2 G EEx p ... IIC T5 ... T3**

This certificate is issued on 4 October 2006 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

KEMA Quality B.V.

G.G. van Es
Certification Manager

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Experience you can trust.

14 DECLARATION OF CONFORMITY

EG-Konformitätserklärung
EC-Declaration of Conformity
CE-Déclaration de Conformité

Wir *(we; nous)*

ELECTROMACH BV, Jan Tinbergenstraat 193, 7559 SP Hengelo

erklären in alleiniger Verantwortung, daß das Produkt
hereby declare in our sole responsibility, that the product
déclarons de notre seule responsabilité, que le produit

EEx p steuerung EBP
EEx p control system EBP
EEx p coffret de commande EBP

auf das sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder normativen Dokumenten übereinstimmt
which is the subject of this declaration, is in conformity with the following standard(s) or normative documents
auquel cette déclaration se rapporte, est conforme aux norme(s) ou aux documents normatifs suivants

Bestimmungen der Richtlinie *terms of the directive* *prescription de la directive*	**Titel und/oder Nr. sowie Ausgabedatum der Norm** *title and/or No. and date of issue of the standard* *titre et/ou No. ainsi que date d'émission des normes*
94/9 EG: Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen *94/9 EC: Equipment and protective systems intended for use in potentially explosive atmospheres* *94/9 CE: Appareils et systèmes de protection destinés á être utilisés en atmosphéres explosibles*	EN 50014 : 1997 + A1, A2 EN 50016 : 2002 EN 50018 : 2000 + A1 EN 50019 : 2000 EN 50020 : 2002 EN 50028 : 1987
89/336 EWG: **Elektromagnetische Verträglichkeit** *89/336 EEC: Electromagnetic compatibility* *89/336 CEE: Compatibilité électromagnétique*	EN 60947-1 : 1999 EN 60439-1 : 1999
EG-Baumusterprüfbescheinigung: *EC-Type Examination Certificate:* *Attestation d'examen CE de type:*	**KEMA 03 ATEX 2103 X**
Qualitätssicherung Produktion: *Production Quality Assessment:* *Assurance Qualitée Production:*	KEMA 01 ATEX Q3201

Hengelo, 05.04.2006

Ort und Datum
Place and date
lieu et date

J.F.W. Wijnen
Geschäftsführer
Managing Director
Directeur Genéral

W.H. Noelard
Leiter Qualitätsmanagement
Head of quality management dept.
Chef du dept. assurance de qualité